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Assessment of surface properties and solvent-borne coating performance of red oak wood produced by peripheral planing

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Abstract

Coating performance on wood could be affected for different aspects including the manner in which the surface is prepared. Peripheral planing is one of the most used machining processes in woodworking. Improving this process would allow to enhance coating performance. As a result, the effects of wavelength and rake angle on surface properties and coating performance were evaluated in an attempt to improve peripheral planing of red oak wood. Surface quality was assessed through roughness, scanning electron micrographs, and wettability analyses. The performance of a solvent-borne coating was measured by adhesion strength before and after accelerated aging. Surface roughness and energy components increased as rake angle increased. As wavelength increased, cell damage and surface roughness increased. Surfaces prepared with a rake angle of 25° had more cell-wall fibrillation, which was assumed to be responsible for increased surface energy and improved coating adhesion after weathering. Samples machined with this rake angle combined with a short wavelength resulted in the lowest loss of adhesion after aging and presented an acceptable level of surface roughness.

Concepts found in this article

Rake Angle
Accelerate Aging Treatment
Red Oak
Scan Electron Microscopy
Surface Energy Component
Pull-off Strength
Wood Surface
Surface Free Energy
Chip Formation
Surface Roughness
Chip Thickness
Robust Gaussian Regression Filter
Oak Wood Sample
Wettability
Total Surface Energy

Related articles containing similar concepts

What is this?

Evaluation of two surfacing methods on black spruce wood in relation to gluing performance
Kuljich, Svetka · Cool, Julie · Hernández, Roger E. in *Journal of Wood Science (2012)*

Rake Angle Shear Strength

An experimental study of edge radius effect on cutting single crystal silicon
Fang, F. Z. · Zhang, G. X. in *The International Journal of Advanced Manufacturing Technology (2003)*

Rake Angle

Experimental investigation of specific cutting energy and surface quality based on negative effective rake angle in micro turning
Wu, Xian · Li, Liang · Zhao, Meng, et al. in *The International Journal of Advanced Manufacturing Technology (2015)*

Rake Angle Effective Rake Angle

Friction coefficient as a guide to optimum rake angle in wood machining
McKenzie, W. M. in *Wood Science and Technology (2004)*

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